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Aerial Mobile Gateway for Wireless Sensor Networks utilizing drones

RoEduNet - September 2014

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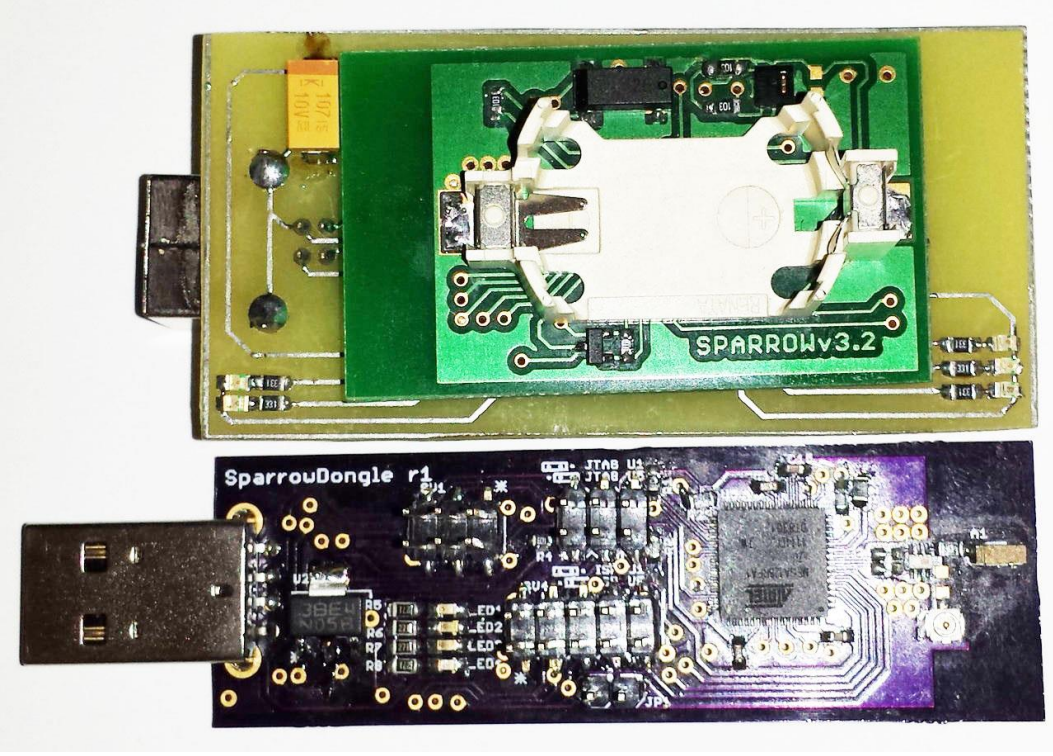
Introduction

- Wireless Sensor Networks
  - small devices
  - wireless communication
  - gather data from environment
  - long battery life

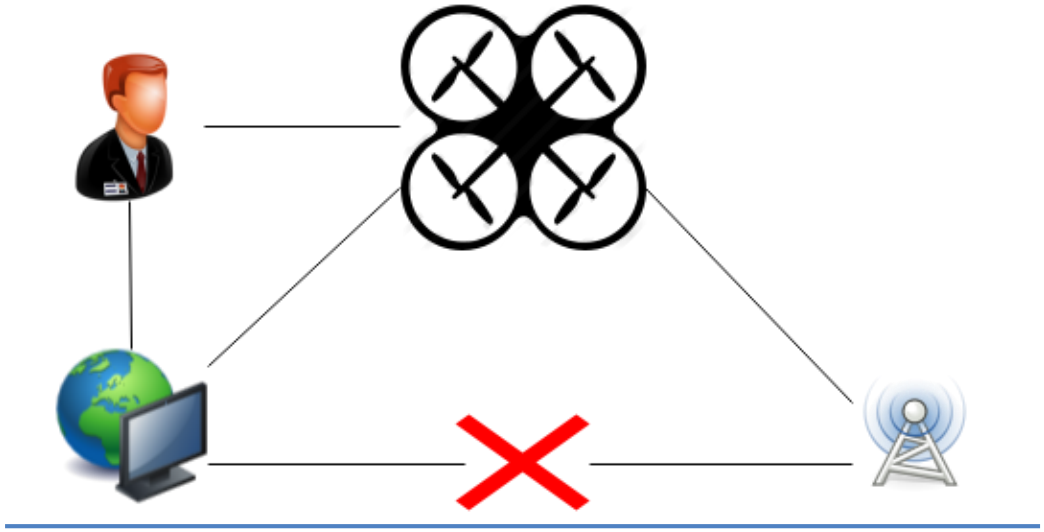
Sparrow Family

- Atmel ATMega32U4 for usb communication
- Atmel ATMega128RFA1 with 2.4 GHz transceiver



Why?

- Location of the network
- Rapid deployment
- Dynamic environment

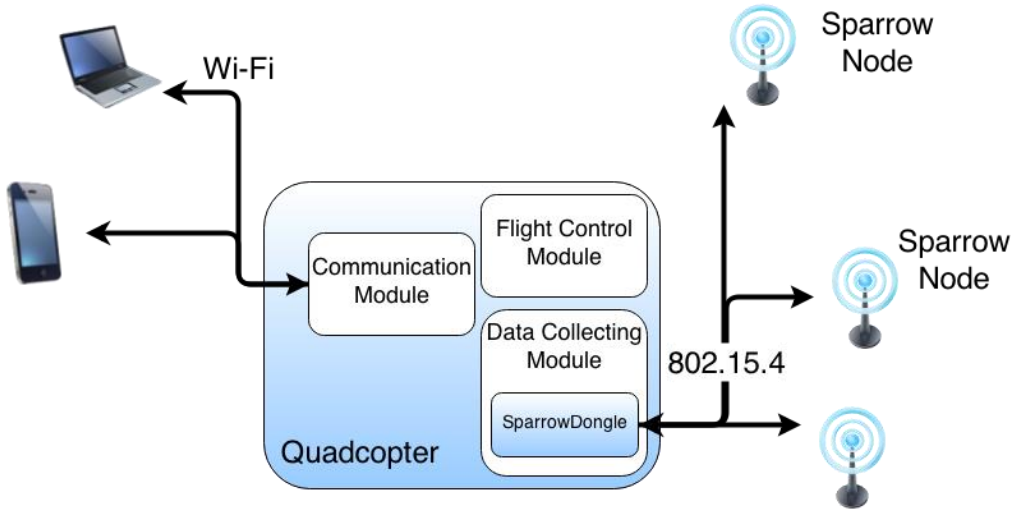


Features

- Ease of interaction
- Proximity function
- Energy Saving
- Latest Data always saved
- Fault Tolerance

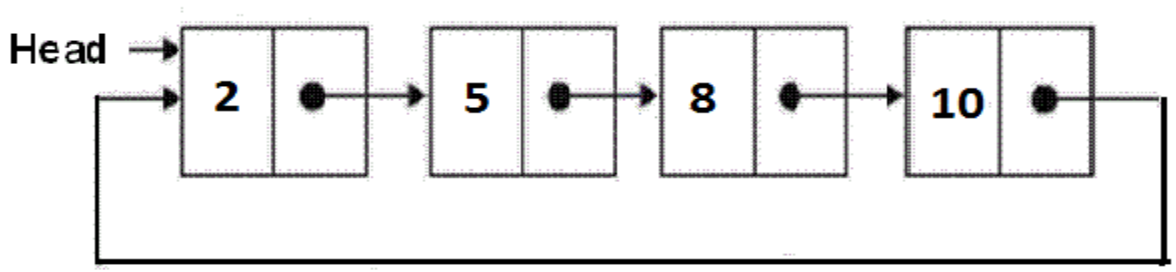
System Architecture

- Sparrow Module
- Data Collecting Module
- Communication Module
- Android Application



Sparrow Module

- Handles node communication
- Saves data in a circular list
- Replaces the oldest data with new data



Data Collecting Module

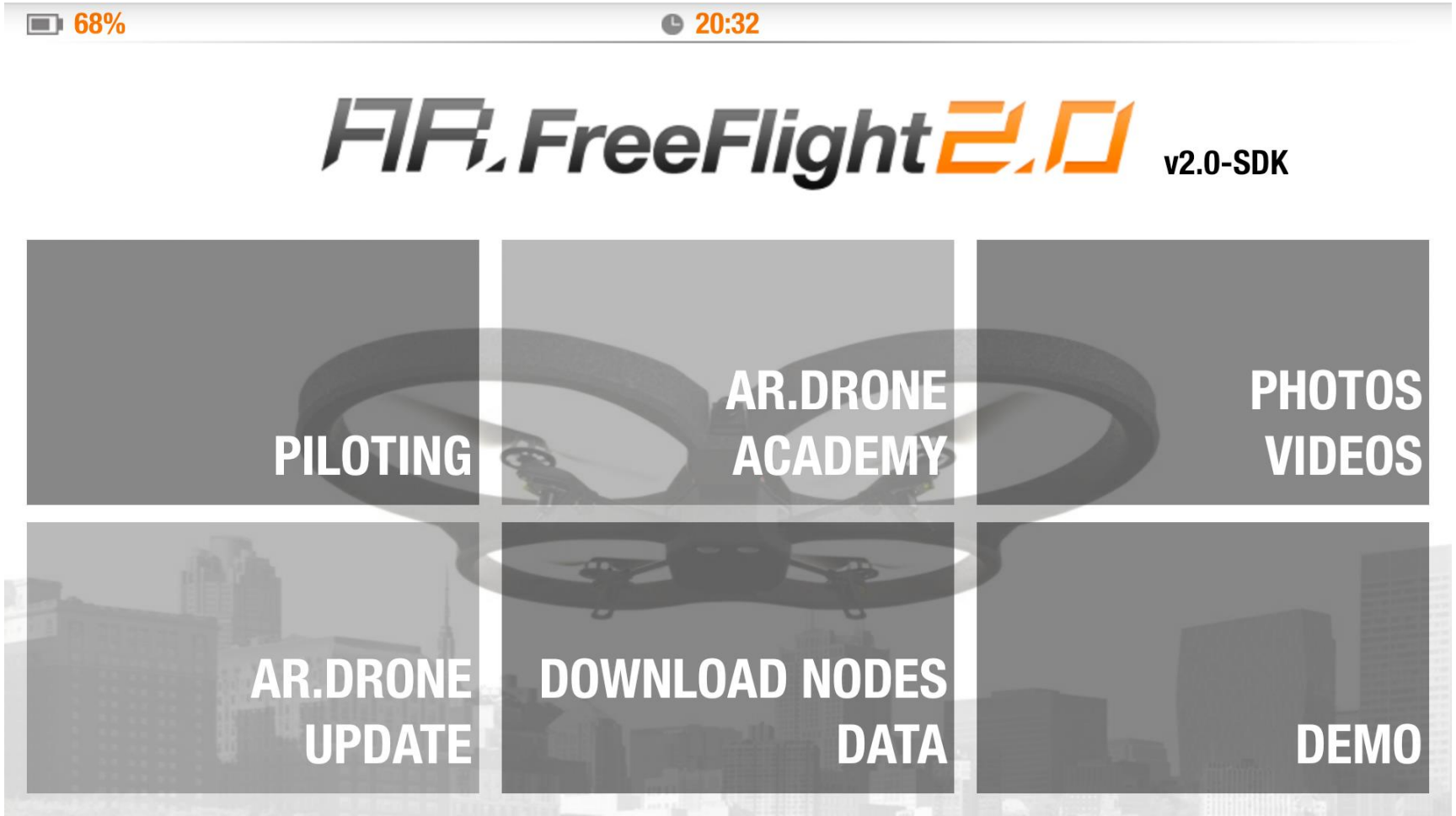
- Detects the presence of a gateway
- Saves the data received from the gateway into files
- Parses the data to obtain node information

Communication Module

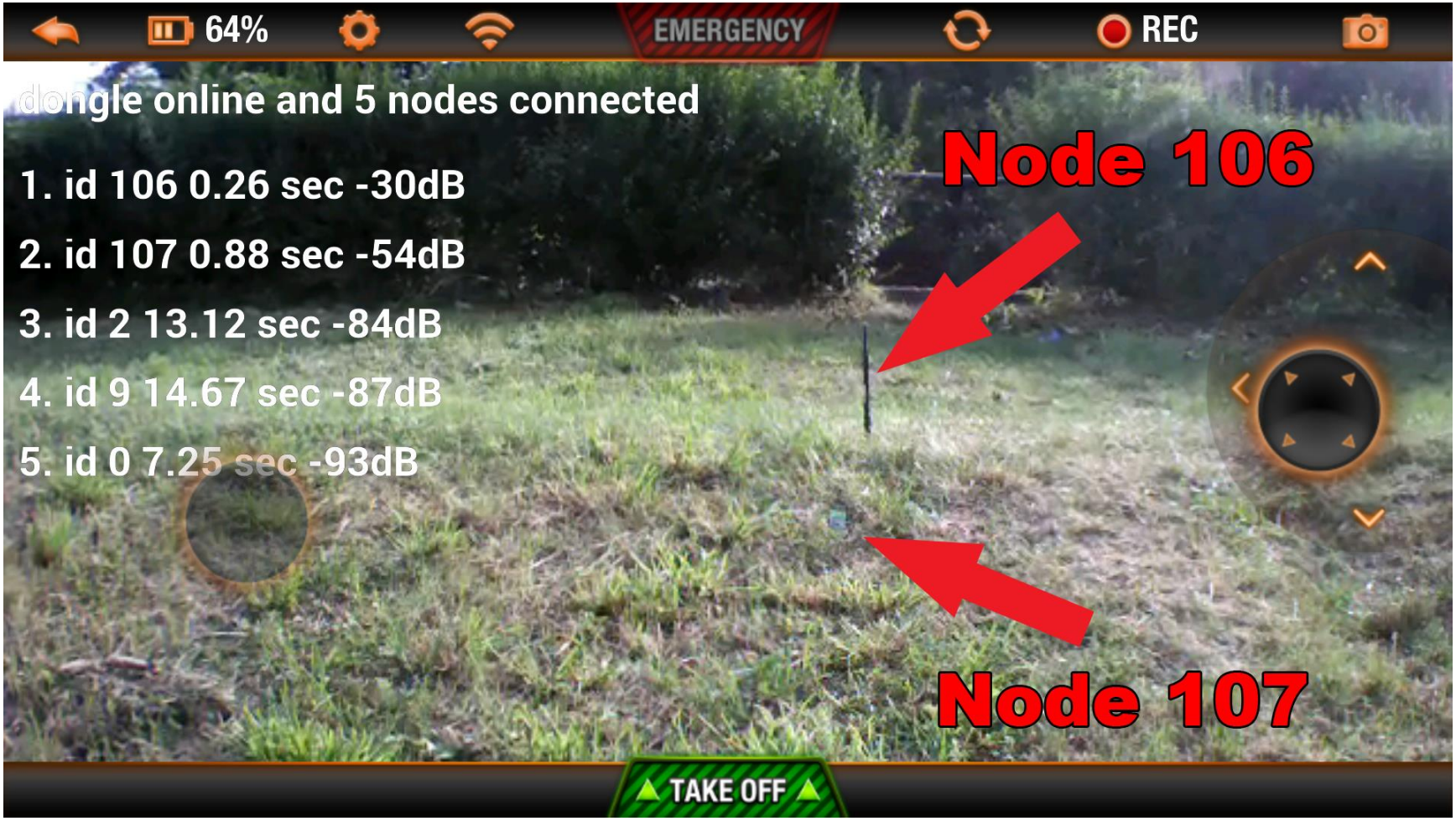
- Creates JSON object with the nodes information
- Sends the object through port 8888
- Listens for new connection if current one is lost

Android Application

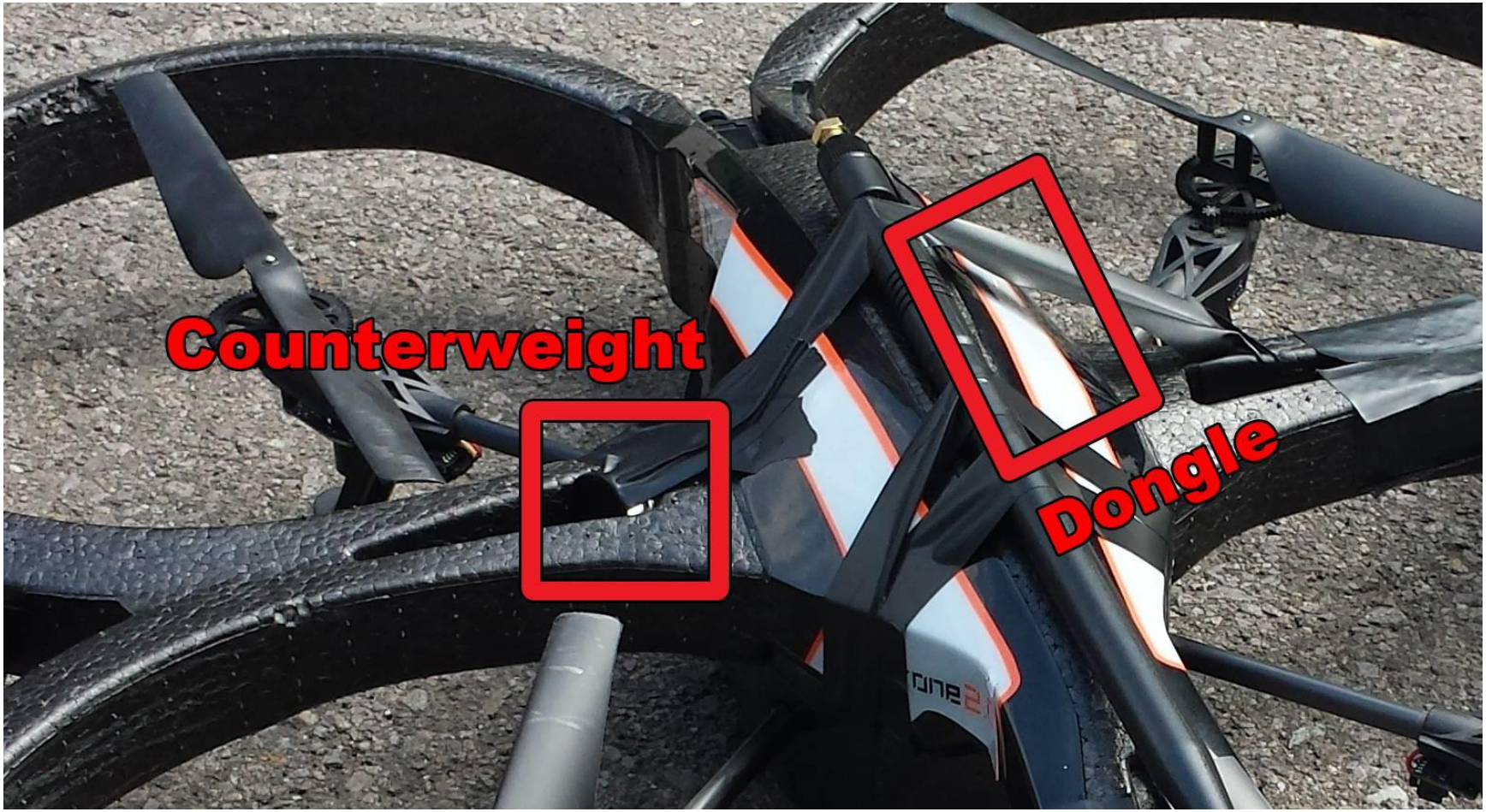
Modified FreeFlight 2.0



Node Informations



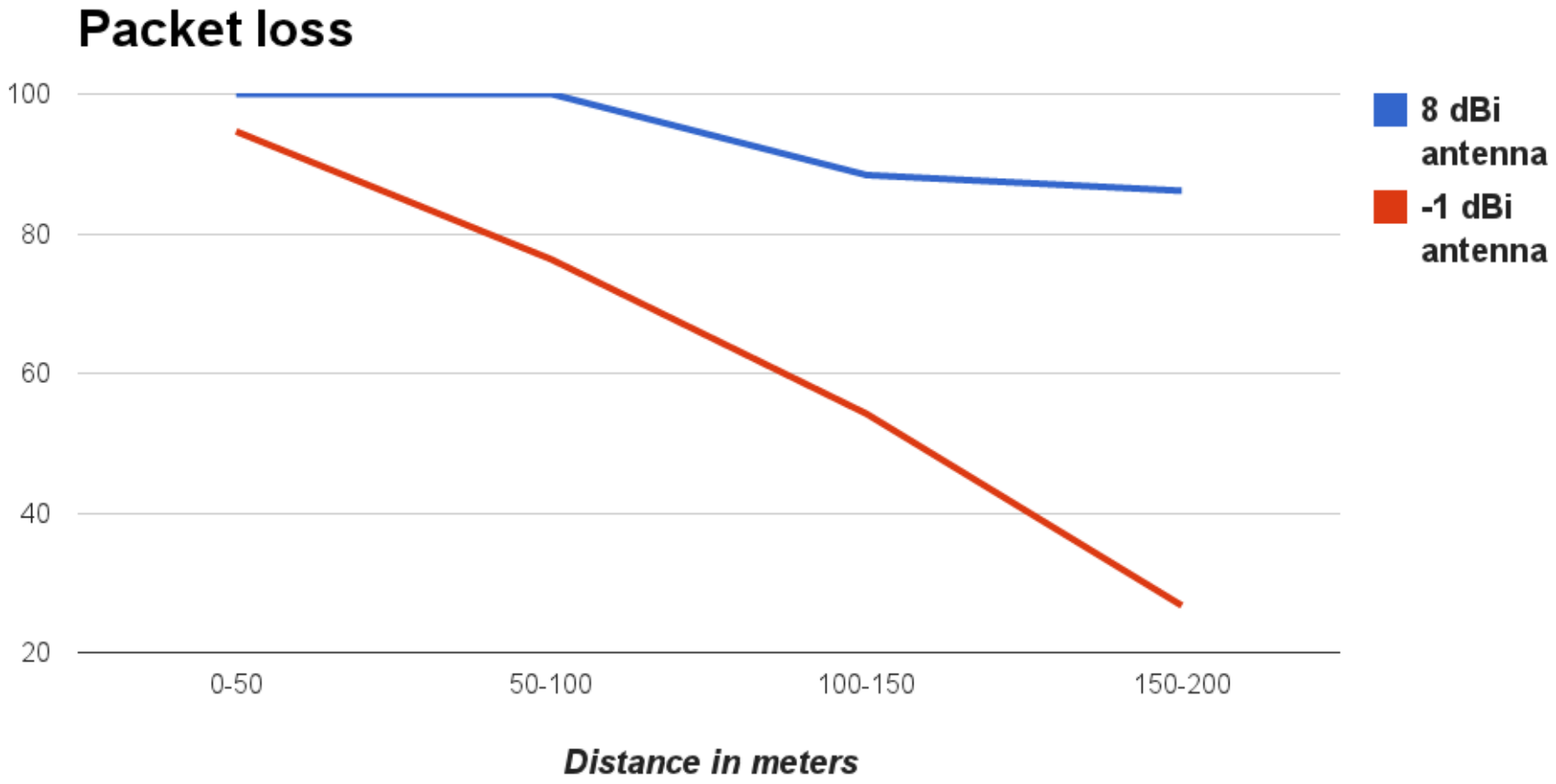
Drone Modifications



Results

- All data saved successfully
- Communication distance - 300 meters with external 8dBi antenna
- Stability – affected by the modifications
- Packet Loss
  - small for an external 8dBi antenna
  - high for a small -1 dBi smd antenna

Packet loss


Packet loss
100
80
60
40
20
0-50
50-100
100-150
150-200
Distance in meters
8 dBi antenna
-1 dBi antenna

Conclusions

- System is functional
- Good transmission distance – up to 300 meters
- Simple to use

Questions